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Third Edition

VIROLOGY

EDITED BY

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APPLETON & LANGE Norwalk, Connecticut/San Mateo, California

D-8385-9462-X

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88 89 90 91 92 / 10 9 8 7 6 5 4 8 2 1

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Library of Congress Cataloging-in-Publication Data

Virology/edited by Wolfgang K. Joklik.-3rd Ed.

p. cm.
Includes bibliographies and index.
ISBN 0-8385-9462-X
1. Virology. I. Joklik, Wolfgang K.
[DNLM: 1. Vertebrate Viruses. 2. Virus Diseases. QW 264 V189]
QR360.V512 1988
616'.0194-dc19
CIP

Cover photograph courtesy of Dr. S. D. Fuller Cover Design: Steven Byrum

PRINTED IN THE UNITED STATES OF AMERICA

TABLE 2-4. THE MAJOR FAMILIES OF ANIMAL VIRUSES (Continued)

Hepadnaviridae

FROM:

- Enveloped icosahedral nucleocapsids
- · Diameter: 42 nm

Hepadnavirus genomes are the smallest human or animal virus genomes known (about 3 kilobase pairs). Their lipoprotein envelope (surface antigen, HBsAg) possesses an extraordinary tendency for self-association, forming spherical or rodlike particles (diameter 22 nm) that are often present in the sera of infected individuals in 10,000fold excess over the 42 nm virions, also known as Dane particles. HBsAg possesses several epitopes, some of which are group-specific, while others are not only type-specific but subtype-specific; thus eight allelic subtypes of human HBV have been described. The epitopes on the core component (HBcAg) are partially group-specific. The replication of hepadnavirus DNA involves reverse transcription of RNA into DNA. Hepadnaviruses exhibit tissue tropism for hepatocytes. Persistent infections are common. Hepadnavirus DNA is capable of integrating into cellular DNA.

Hepatitis B virus (HBV)

Host Humans

RNA-Containing Viruses

Symptoms in humans

Acute and chronic hepatitis; cirrhosis; hepatocellular carcinoma; immune complex disease; polyartentis: glomerulonephritis; infantile popular acrodermati-

tis: aplastic anemia

Woodchuck hepatitis B virus (WHBV) Ground squirrel hepatitis B virus (GSHBV) Duck hepatitis B virus (DHBV) Tree squirrel hepatitis B virus (TSHBV)

Eastern woodchuck Ground squirrel Peking duck Tree squirrel

Symptoms in humans

Parvoviridae

- Naked icosahedral nucleocapsids
- Diameter: 22 nm

Parvoviruses contain single-stranded DNA. Members of the genus Parvovirus encapsidate negative-stranded DNA preferentially (50-99%); but particles of members of the Dependovirus and Densovirus genera encapsidate plusand minus-stranded DNA with equal efficiency. The replication of parvoviruses tends to be dependent on helper functions which for members of the genus Parvovirus are supplied by rapidly growing (not resting) cells, which explains why they are often found associated with tumors and possess oncolytic properties; and for members of the genus Dependovirus by coinfection with adenoviruses, herpesviruses, or poxviruses. The essential function that must be supplied is most probably activation of the transcription of the parvovirus genome. Members of the genus Parvovirus are 70-90% related genetically; those of the genus Dependovirus 60-70%. The rodent parvoviruses are unrelated immunologically to FPLV, CPV, and MEV, which are themselves closely related immunologically. Pervoviruses generally have narrow host ranges. Parvoviruses can establish latent infections; cells latently infected possess parvovirus genomes integrated into their DNA, but are not transformed and exhibit no discernible chance in phenotype.

Genus Parvovirus	***************************************	Symptoms in nomans
Parvovirus-like agent (PVLA) Strain B19	Humans	Enthemia infectiosum (fifth disease); linked to aplastic crisis in hemolytic anemia/sickle cell anemia
Lu-111	Humans	No known disease
Feline panleukoponia virus (FPLV)	Cat	441
Canine parvovirus (CPV)	Dog	_
Mink enteritis virus (MEV)	Mink	-
Hamster osteolytic viruses (H-1, H-3, x-14)	Rat, hamster	
Kilham rat virus (KRV)	Rat	
Minute virus of mice (MVM)	Mouse	_
Aleutian mink disease virus	Mink	·
Porcine parvovirus	Pig	_
Bovine parvovirus	Cattle	-
Genus Dependovirus		
Adeno-associated virus (AAV) Serotypes 1,2,3,5	Humans	Antibodies very prevalent; no known symptoms
Serotype 4	Monkeys	KNOWN SYMPTOMS
Genus Densovirus		-
Densonucleosis viruses	Insects	
	RNA-containing Viruses	

Host

Picomaviridae

- Naked icosahedral nucleocapsids
- Diameter: 25–30 nm

Picornaviruses comprise a large number of virus strains pathogenic for many animals species. They are subdivided into four genera: Enterovirus and Cardiovirus, whose members are acid-stable, and Rhinovirus and Aphthovirus, whose members are acid-labile.

Genus Enterovirus Human enteroviruses Poliovirus

Host

Symptoms in humans

Humans, monkey

Poliomyelitis

Symptoms in humans

TABLE 2-4. THE MAJOR FAMILIES OF ANIMAL VIRUSES (Continued)

RNA-Containing Viruses

Host

Retroviridae (RNA tumor viruses)

Subfamily

- · Enveloped particles containing a coiled nucleocapsid within a probably icosahedral core shell
- Diameter: about 100 nm

The retrovirus family comprises a large group of viruses characterized by a common morphology, a genome that consists of two identical plus-stranded RNA molecules, and possession of reverse transcriptase. There are three subfamilies. The first, the Oncovirinae, comprises the C-, B-, and D-type retroviruses. These viruses are oncogenic; they cause leukemias, lymphomas, mammary and neuronal tumors. The second subfamily, the Lentivirinae, comprises the Visna group of viruses. They resemble the Oncovirinae with respect to morphology, nature of the genome and possession of a reverse transcriptase, but do not transform cells. The third subfamily, the Spumavirinae, comprises the foamy viruses, which are found in spontaneously degenerating kidney (and other) cell cultures, causing the formation of multinucleated vacuolated giant cells that have a highly characteristic appearance.

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